

# Ecological Studies on Tasmanian Bryophyta

by

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## **Declaration**

This thesis contains no material which has been accepted for a degree or diploma by the University of Tasmania or any other institution, and contains, to the best of my knowledge and belief, no material previously published or written by another person except where due reference is made in the text of the thesis.

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## Abstract

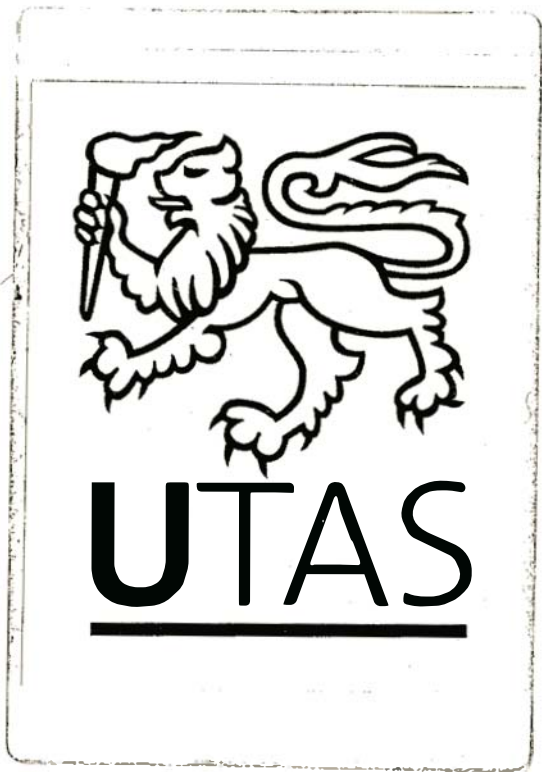
This thesis presents an historical background on bryological studies in Tasmania in order to provide a context for the floristic and ecological investigation of these cryptogams as a component of the epiphytic flora in rainforest communities.

The period from the mid-nineteenth century to the early decades of the twentieth century saw the greatest effort in taxonomy of bryophytes. The discovery and description of much of the bryological flora of Tasmania resulted from the works of J.D. Hooker, R.A. Bastow, W.A. Weymouth and culminated in the two volume Bryophyta of Tasmania by Leonard Rodway. There followed a period of almost half a century during which bryophytes received little attention and the last two decades have been devoted to a reappraisal of our taxonomic knowledge of this group. We can confidently recognise in our current flora 361 species of moss and 282 species of hepatics, and their biogeographical affinities to other southern land masses is discussed. In contrast there have been relatively few studies on other aspects of their biology and this thesis attempts to explore an ecological role of bryophytes.

In this account a study on a particular ecological niche has been chosen. The floristic composition and adaptations of epiphytic bryophytes have been investigated on two major rainforest tree species in western and north-western Tasmania. Studies elsewhere on epiphytic bryophytes have produced varied results on both floristic composition and controlling factors. There was a total of 61 bryophytes recorded from the trunk region of *Nothofagus cunninghamii* (angiosperm) and *Athrotaxis selaginoides* (conifer) throughout 12 rainforest sites. Most species were facultative epiphytes. The hepatics were found to be the dominant component and the bark of *N. cunninghamii* was clearly the preferred substrate. There was considerable variation in numbers of epiphytes per tree and it would appear that microclimatic factors rather than bark characteristics are having the greater influence for a change in composition of the epiphytic flora from one forest system to another.

The epiphytic bryophyte is almost entirely dependent on its surrounding environment for its existence. Therefore a variety of ectohydric strategies would appear to be employed to sustain the plant in that habitat. The majority of epiphytic mosses and hepatics studied on the two host tree species exhibit inter-organ capillary ectohydric conduction. A few displayed epi-organ capillary conduction (papillosity) and these adaptations were studied in detail using scanning microscopical techniques. The form of papillae ranged from a single dome-shaped papilla to multi-stalked papillae per cell.

The advent of the environmental S.E.M. revealed a marked improvement in describing these varied delicate surface features when compared to the traditional S.E.M. procedure of fixation, dehydration and critical point drying. The role of these papillae in distributing water over the surface of the plant as well as preventing excessive accumulation over the cell that would limit photosynthesis and respiration is discussed.



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